National Aeronautics and Space Administration

NASA'S TECHNOLOGY INFUSION

ROAD TOUR

Historically Black Colleges/Universities & Minority Serving Institutions

NEW MEXICO STATE UNIVERSITY

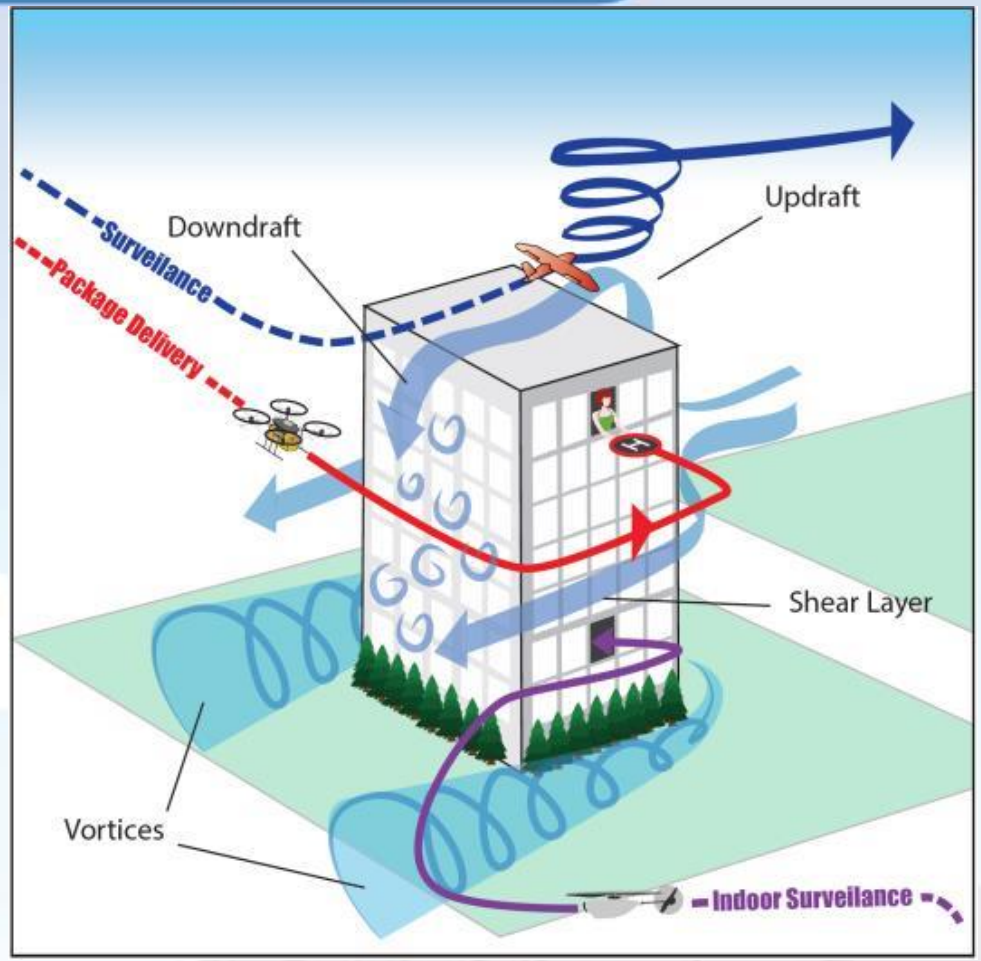
Safe Operation of Collaborative Small Unmanned Aerial Systems in Challenging Environments

Liang Sun, MAE, NMSU

August 13, 2019

Office of Small Business Mentor-Protégé Program

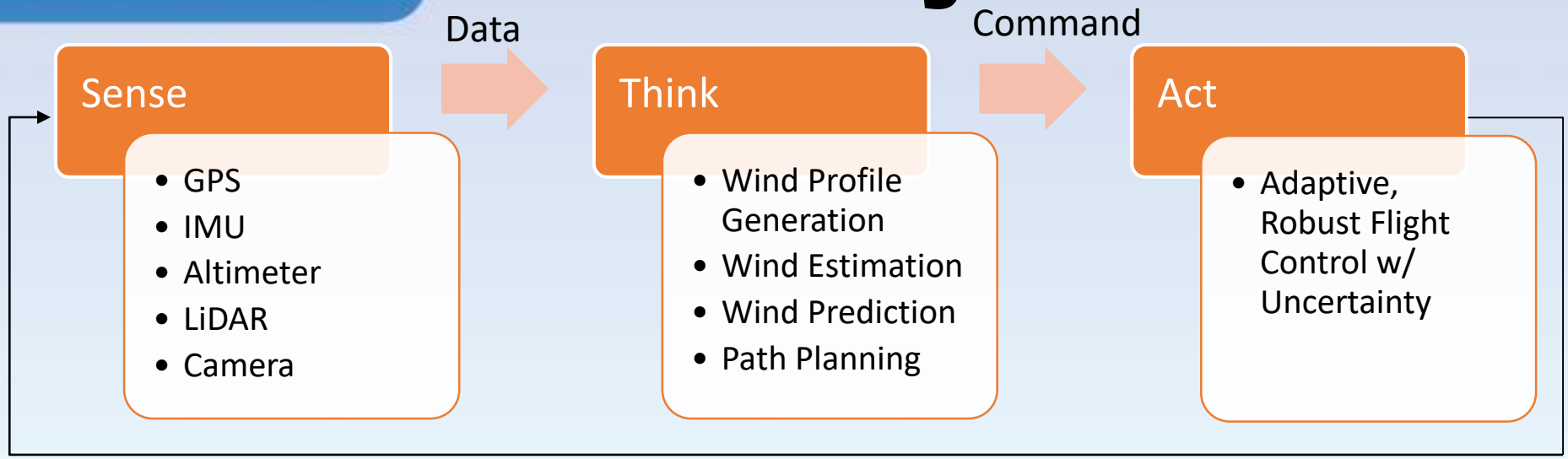
Motivation: UAM Challenges



Picture credit: Watkins et al., AIAA SciTech, 2019

Picture credit: Electronic Design

Autonomy Framework



- Wind Profile Generation
  - Airwakes modeling and reduced-order model using CFD (collaborator: **Dr. Andreas Gross** @NMSU)
- Wind Visualization
  - Application of Particle Image Velocimetry (PIV) (collaborator: **Dr. Fangjun Shu** @NMSU)
- Collaborative Wind Estimation and Prediction
- Distributed Adaptive Control w/ Uncertainty

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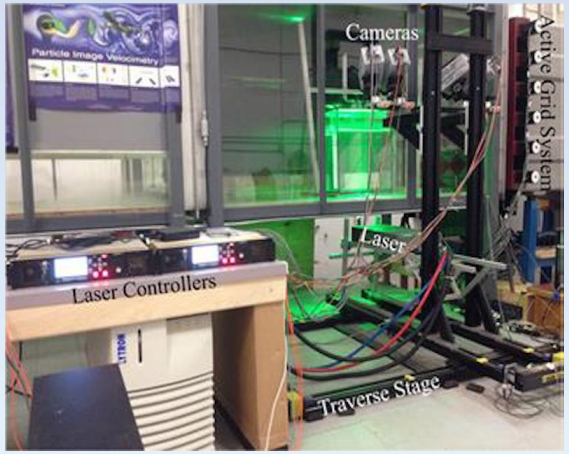
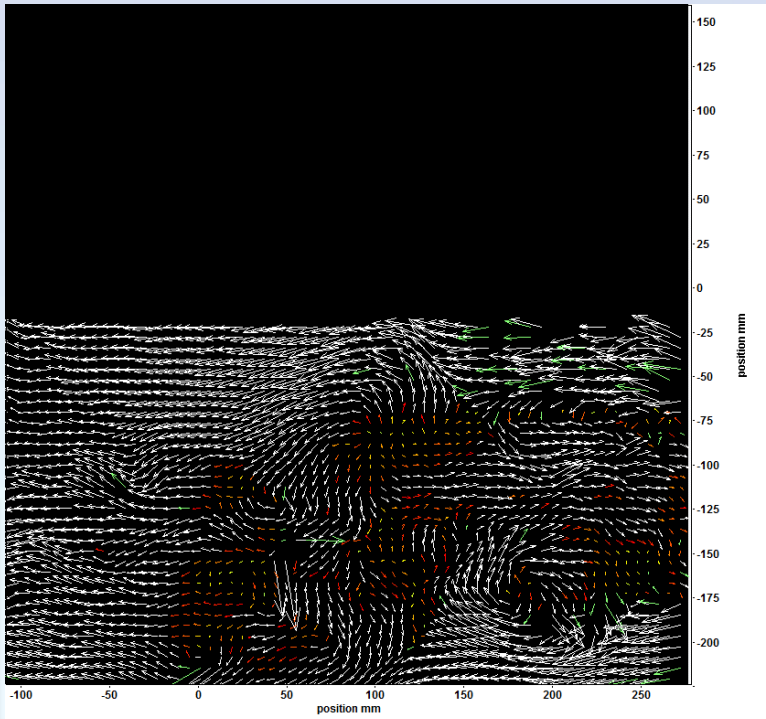
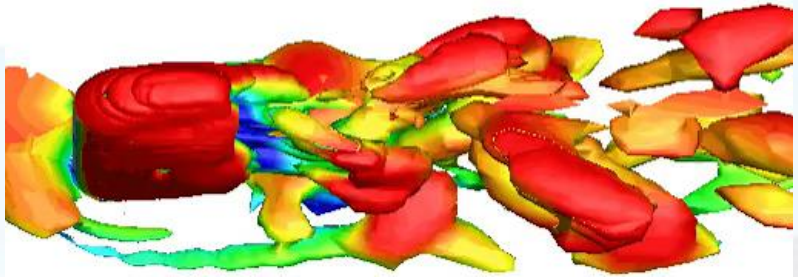
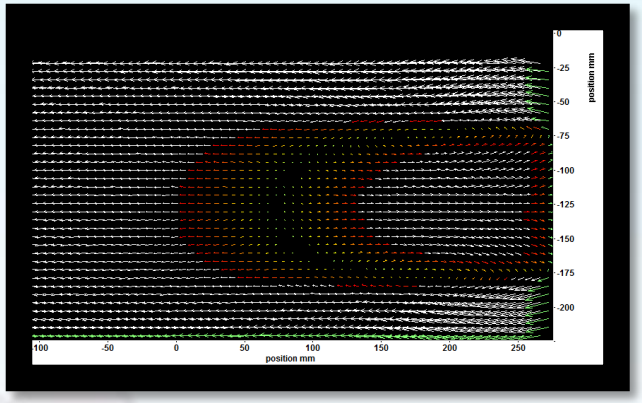
CFD Modeling and Wind Tunnel Testing









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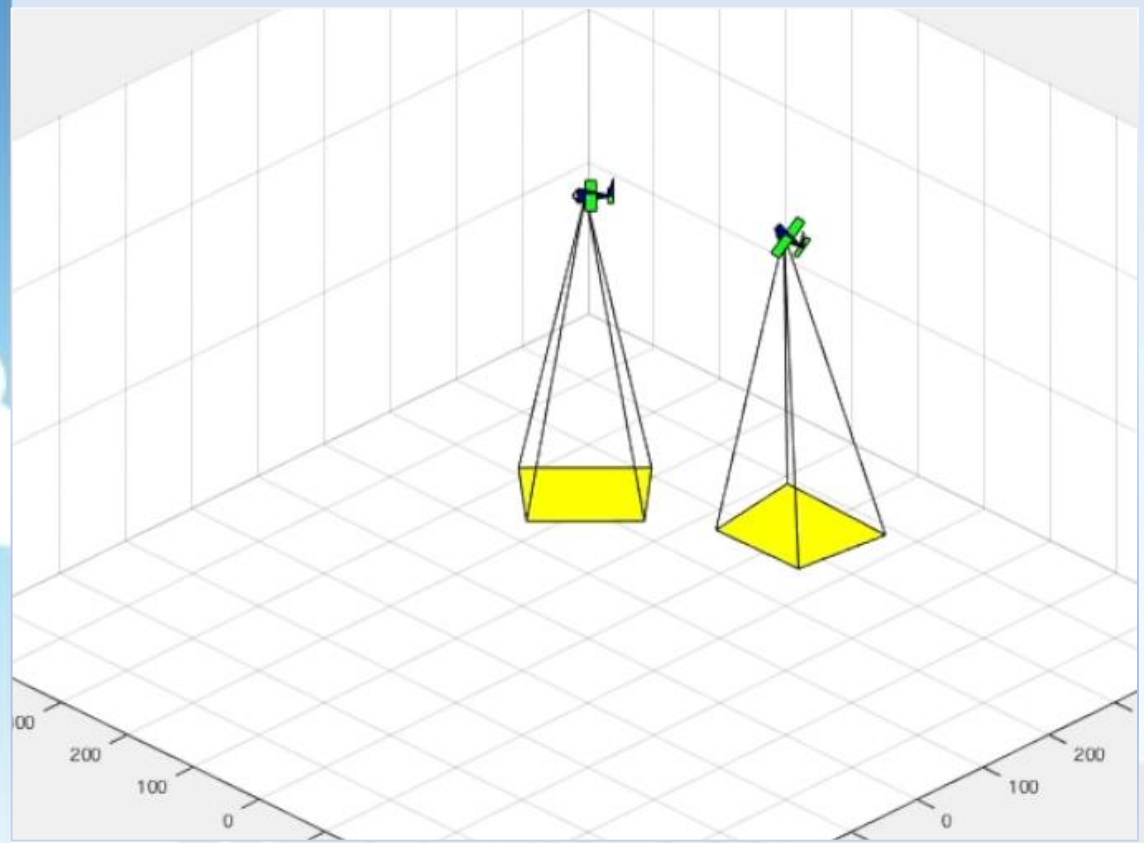
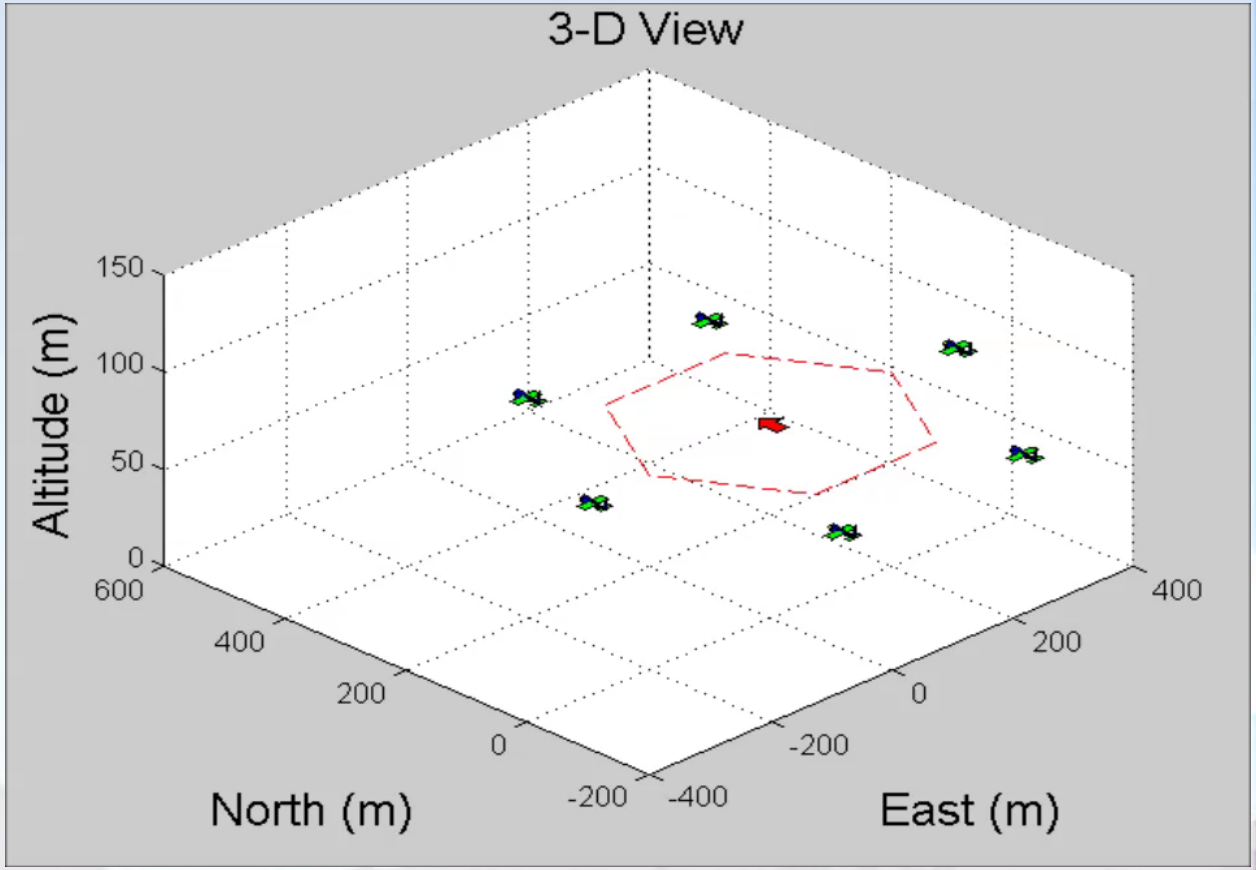
Distributed Adaptive Control

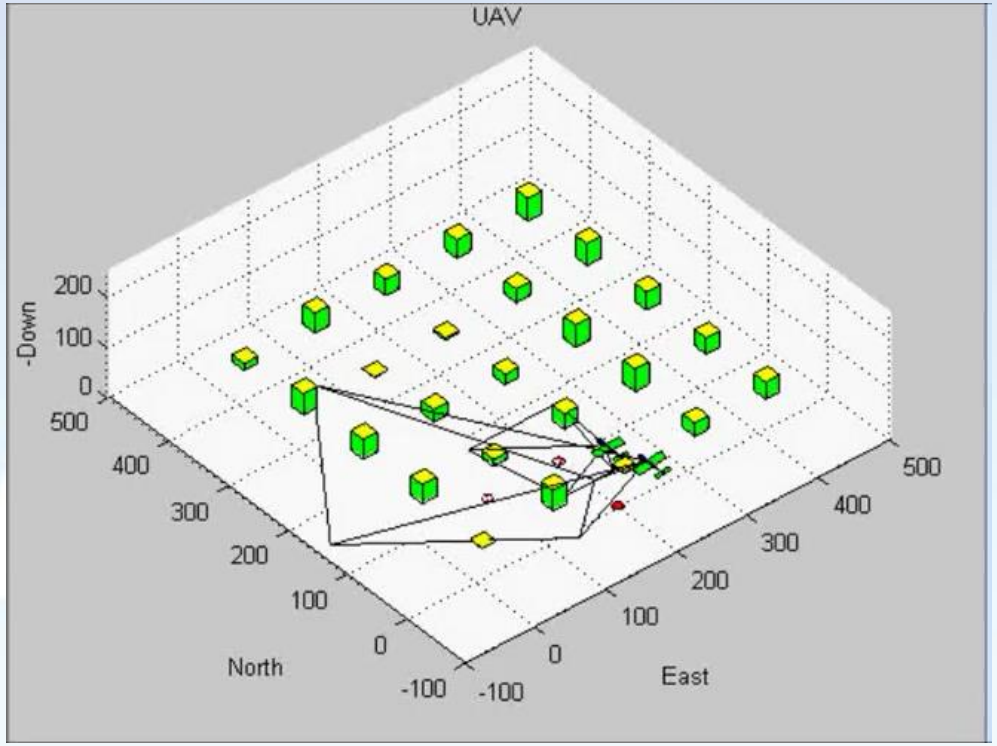
Formation Flight in GPS-Degraded Environments





Other Projects

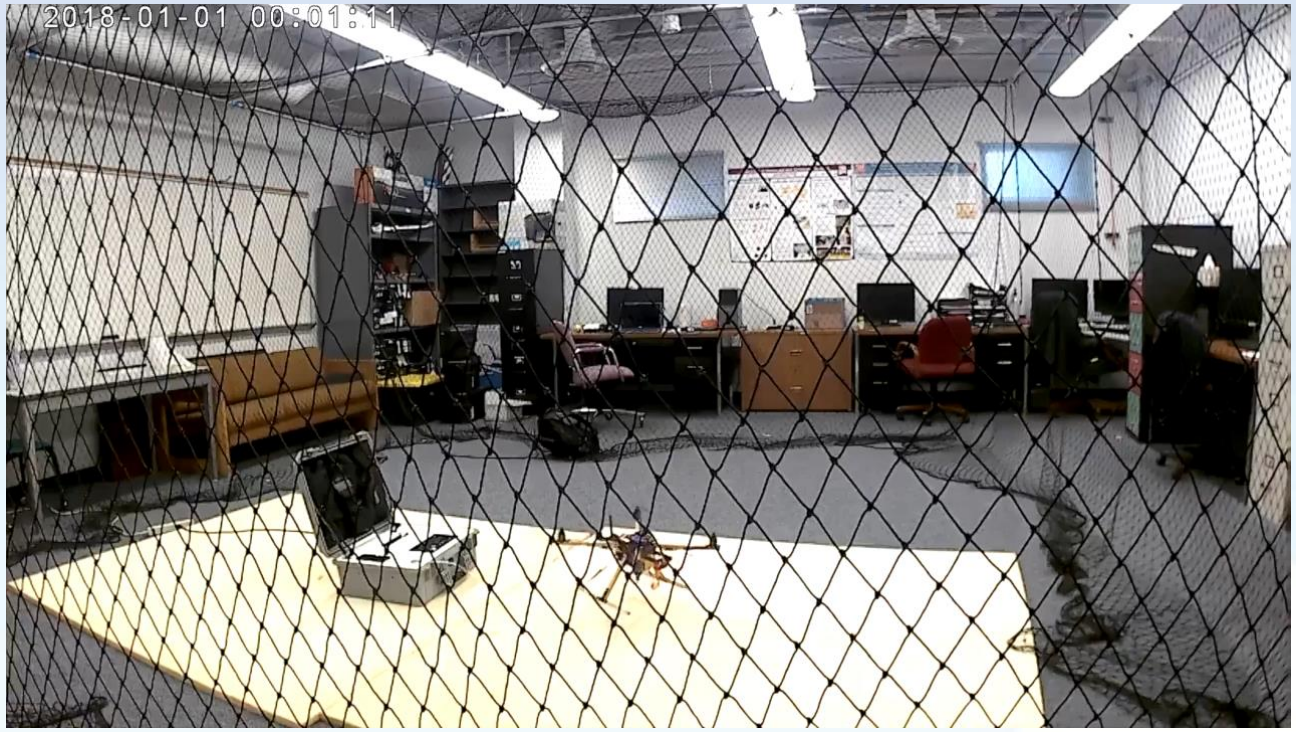
Multi-Target Search and Tracking



Research Topics:

- Decision-Making/Optimization w/ Uncertainty
- Distributed Dynamic Task Allocation
- Collaborative Path Planning

Autonomous Tethered Drones



Research Topics:

- Dynamics Modeling
- Learning-Aided State Estimation
- Distributed Adaptive Control

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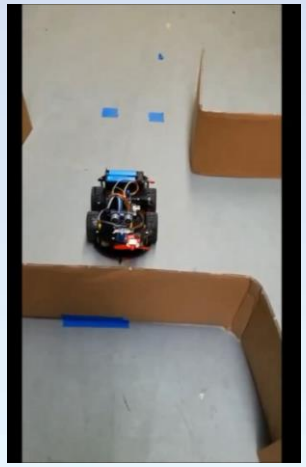
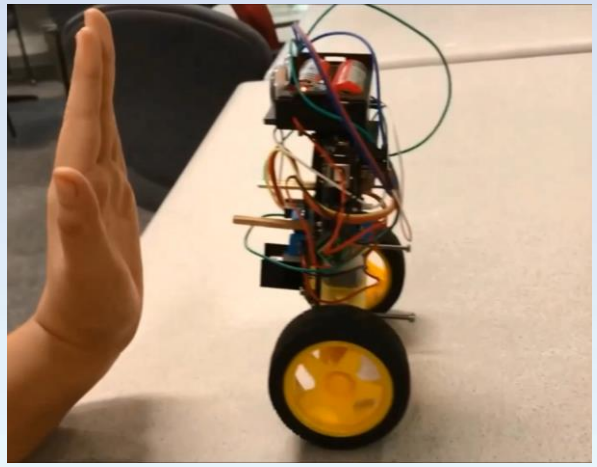
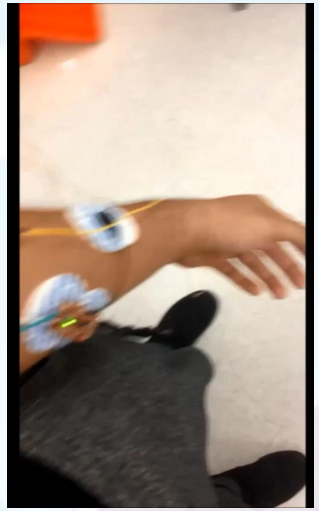
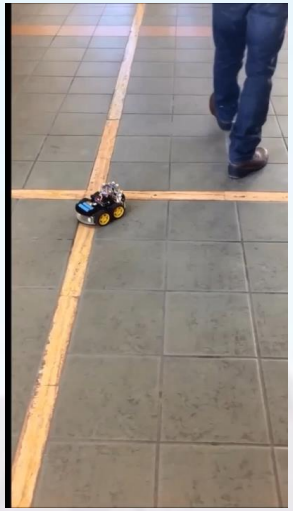
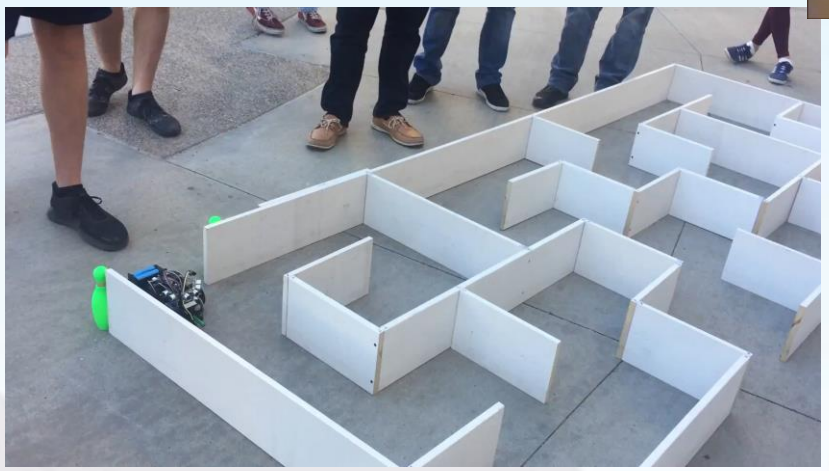
Education

Electronics and Systems Engineering (ME210)

Mechatronics (ME487/587)

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